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ABSTRACT

This study examined the character of the emerging systems of corporate management in Australian universities and their effects on academic and administrative practices, focusing on relations of power. Case studies were conducted at 17 individual universities of various types. In each institution, interviews were conducted with senior managers/leaders, middle-level academic managers (faculty deans), and a range of other personnel. The study shows that the Australian government has led the change to a performance-based competitive system with a single, standardized system of funding, funds distribution, and measurement of research activity. Study findings are organized under five broad headings: (1) the emergence of a new kind of strategic leader; (2) the eclipse of collegial systems of decision making and the rise of management-controlled "post-collegial" mechanisms for decision making and consultation; (3) changes in research management, with consequent effects on academic work; (4) commonalities and variations in the different New Universities; and (5) changes in universities in the context of developments in public management. Overall, the study found more corporate-style university managements emerging in all institutions. It is concluded that the new research system is creating perverse incentives in academic terms such as the primacy of money income for research over research activities and outputs, the primacy of research quantity over quality, and the tendency to "flatten out" distinctions among the disciplines for administrative purposes. (Contains 13 references.) (DB)

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The Best of Times and the Worst of Times:

Research managed as a performance economy – the Australian case

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ASHE *Association for the Study of Higher Education*

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Abstract

In the last decade research organisation in Australian higher education has been transformed into a performance-based system in the form of a competitive economy, with a single standardised system of funding, funds distribution and the measurement of research activity. This transformation has been led by the Commonwealth Government and implemented by the more corporate-style university managements emerging in all institutions during this period. This research system creates incentives perverse in academic terms, such as the primacy of money income for research over research activities and outputs, the primacy of research quantity over quality, and the tendency to 'flatten out' the distinctions between the disciplines for administrative purposes. Increasingly, discipline-based networks are circumvented, and researcher-controlled research is at risk.

1. Introduction

This paper derives from research on 'management practices in higher education, Australia' a project funded by the Australian Research Council from 1995 to 1997. The Principal Investigators were Simon Marginson (then University of Melbourne, now Monash University), Mark Considine (University of Melbourne) and Bob Bessant (La Trobe University). The Research Assistant was Rachel Boston. The project was housed at the Centre for the Study of Higher Education at the University of Melbourne.

The research was designed to investigate the character of the emerging systems of corporate management in Australian universities and their effects in academic and administrative practices, focusing on relations of power. During the course of the project case studies were conducted in 17 individual universities, representing just under half of all Australian universities and incorporating more than half of all student enrolments. Universities in all States and all broad types (see section 2 below) were included. In each institution interviews were conducted with senior manager/leaders, middle-level academic managers (Faculty Deans) and a range of other personnel. The research program was prepared in collaboration with each of the institutions concerned. Interviews were normally conducted on a 'not for individual attribution' basis. No limits were placed on the questions asked or the subsequent use of the research materials.

The researchers found that in recent years organisational systems and cultures in Australian higher education have undergone a profound transformation, coining the term 'New University' to encapsulate these changes. The main findings from the case studies and associated documents - in the context of policy and academic literature in the fields of higher education studies, and public administration – fall under five broad headings:

- The emergence of a new kind of strategic leaders (as Vice-Chancellors/Presidents);
- the eclipse of collegial systems of decision-making and rise of management-controlled 'post-collegial' mechanisms for decision-making and consultation;
- changes in research management, with consequent effects in academic work;
- commonalities and variations in the different New Universities;

- the changes in universities in the context of developments in public management.

This paper is drawn from the project findings in relation to research management.

2. *The Australian higher education system*

In 1997 there were 658,835 students enrolled in the higher education system, slightly less than 4 per cent of the total population of Australia. Approximately 30 per cent of young people in the late teenage years entered the higher education system within the two years after leaving school. There was also substantial later year entry: in 1997 the lifetime participation rate of the current cohort of teenagers was estimated as 45 per cent (West 1998). It is meaningful to refer to a higher education 'system' in Australia because there is a near comprehensive common framework of funding and regulation, consisting of 40 public universities and two private universities. These institutions receive on average approximately 60 per cent of their total funding from the Commonwealth (national) Government, and are subject to the accountability requirements of the Higher Education Funding Act. The various State and Territory Governments play a negligible funding and policy role in the higher education sector, except that they provide the establishing legislation constituting each university.[1] The overwhelming majority of all universities are comprehensive doctoral institutions, varying in size from 4491 students (University of Ballarat, Victoria) to 39,648 students (Monash University, also in Victoria: see DEETYA 1997). There is no equivalent of the American four year colleges.

The doctoral universities fall into four broad groups, according to variations in their resource base, research role and social prestige (Marginson 1997b). The oldest universities in each state, the 'Sandstones' (Sydney, Melbourne, Queensland, Adelaide, Western Australia, Tasmania), plus the three 'Redbricks', the most successful of the post second world war foundations (the Australian National University in Canberra, New South Wales, Monash) enjoy the highest academic standing in most fields. Together they conduct more than 90 per cent of all publicly funded research between them, and an even higher

proportion of the commercially-funded research projects. The large Universities of Technology in each state (Sydney, Queensland, Curtin, University of South Australia, Royal Melbourne Institute of Technology) focus on graduate employability and selected applied research programs, and also enjoy considerable social standing. The third group, the other pre-1987 universities, was founded on a comprehensive basis, and include areas of considerable research strength, but are facing greater difficulties during a period of declining government funding. The fourth group consists of newer, post-1987 universities, many of the regionally based, and with varying specialisations, missions, strategies and fortunes. In the study of 'Management practices in higher education', the cases included five 'Sandstones', two 'Redbricks', two Universities of Technology, five other pre-1987 universities, and three universities drawn from the post-1987 group.

There is a handful of private institutions outside the Commonwealth national system and receiving no funding support, except in the form of research grants. Two of these, Bond University on the Gold Coast in Queensland and Notre Dame Australia in Perth, Western Australia, aspire to become comprehensive institutions. The economics of Australian higher education are not favourable to private institutions, despite numerous attempts to establish such institutions (Marginson 1997c). Private universities remain ineligible for government tuition subsidies, and their students normally pay full cost fees. In contrast, undergraduate public education is largely based on the Higher Education Contribution Scheme, a system of government-underwritten deferred payment for part of tuition costs. This operates in the form of an interest-free loan with income contingent repayments - students are obliged to begin HECS repayments through the tax system only when their annual income reaches $20,700 AUD - and this protects most full-time undergraduates from direct tuition costs. Thus public higher education has a substantial cost advantage.

At the postgraduate stage matters are different. About half of all enrolments are subject to direct fees covering part or all of costs, with the remainder, mostly in research-based degrees, receiving postgraduate scholarships, or paying the HECS. Postgraduate fees range up to $40,000 AUD or more in business and legal education, where there is a common market covering private and public institutions. The other important tuition market,

[1] Universities in the Australian Capital Territory and the Northern Territory are constituted by the Commonwealth Parliament, however.

providing more than 7 per cent of all income, is in international education. In 1996 there were 53,188 international students, 8.4 per cent of all enrolments in higher education. Of these students 99.5 per cent paid full-cost fees. Most were enrolled in business studies (48.4 per cent), science and computing, and engineering (DEETYA 1996a). The number of fee paying international students has grown rapidly since the fee-based market was established in 1987: it is often argued that in this development, commercial objectives have tended to lead education objectives, rather than vice versa (Marginson 1997a).

Higher education institutions, nearly all of which are classified as universities, are separate from the extensive Vocational Education and Training (VET) sector, which includes 106 public and more than a thousand private training institutions. In 1997 there were 1.459 million students aged 15 years and upwards enrolled in public VET institutions, mostly on a part-time basis (NCVER 1998). The role of VET has some feature in common with American community colleges – though there is a more pronounced vocational orientation, and articulation with higher education as yet less well developed – and some features in common with the German *Fachhochschulen*. The Australian VET sector offers courses up to and including two-year (diploma) level, where there is some overlap with higher education. There is increasing cooperation between VET and higher education, with four institutions that incorporate both sectors, a growing number of cross-sectoral combined courses on offer, and at least some formal cross-sectoral articulation agreements in every higher education institution. However, the VET sector is not yet significantly involved in major research programs, and falls outside the ambit of this paper.

3. *Recent developments in research policy*

Government research support in Australian universities traditionally took a dual form, similar to that applying in British universities. Individual academics or academic teams were eligible to apply for government-funded project grants - allocated on a competitive basis, mostly in science-based disciplines - and it was expected a proportion of Commonwealth funding for on-going recurrent costs (operating grants) was applied by each institution to research support. This notional proportion of research funding was estimated at 30 per cent, although there was never any solid empirical grounding for this

estimate. Internal distribution between disciplines and the mechanisms of allocation were left in the hands of the individual universities, and thus subject to academic politics.

In 1988 the Commonwealth Government under reforming Minister John Dawkins decided to abolish the distinction between universities and colleges of advanced education and form a unitary higher education sector, in which all institutions would be designated universities and eligible for Commonwealth support for research (Dawkins 1988). Previously only institutions in the university sector - constituting approximately half of all higher education enrolments - were required to carry out research as a routine aspect of their activity. Simultaneously, Dawkins moved to establish a more regulated, managed and standardised system of research funding and activity in universities; and commenced a long term move away from the dual system of support towards reliance on grants for specified limited life projects as the principal means of research support. This in turn was associated with a weakening of the traditional teaching-research nexus in academic work, and a trend to greater concentration of research activity and selectivity in research support, augmented by the growing use of systems of competitive allocation of funding.

The Australian Research Grants Scheme was replaced by a newly-constituted Australian Research Council (ARC). The ARC programs, coupled with those of the National Health and Medical Research Council grants in Medicine and related fields, were constituted as the premier systems of nationally competitive Commonwealth research funding, in the form of project grants, equipment assistance and fellowships. Further, a range of specialised nationally competitive grants emerged- or existing project granting schemes were augmented - in fields such as Engineering and Earth Sciences and Communications and Information Technology. At the same time, the capacity of Commonwealth operating funding to support on-going institution-determined research activity was reduced. In a period of rapid enrolment growth, the growth of Commonwealth operating funding did not keep pace with the growth student load or the rising costs of research activity. The proportion of total higher education costs covered by operating funding originating from the Commonwealth declined from 87 per cent to 62 per cent between 1986 and 1995. Commonwealth money was partly replaced by income from international student fees, postgraduate fees and research and consultancy activity, forms of income which did not spread evenly over the disciplines and tended to favour those disciplinary fields such as

Business Education, Computing and Applied Engineering which were the most market-active. One measure of the increasing pressure on operating grants was an increase in the average student-staff ratio from 12 to 1 in the mid 1980s to 15 to 1 by the early 1990s (DEETYA 1993). Widespread concerns about deterioration in the infrastructure supporting research (equipment, libraries, technical staff) led to specific Commonwealth funding for research infrastructure. This was in part distributed according to success in competition for project grants, reinforcing the move away from universal support for research.

At the same time the Commonwealth encouraged the formation of limited life research centres through its specific programs of support for Special Research Centres, and Cooperative Research Centres with industry. Together these schemes constituted a larger allocation than ARC grants. Centre funding went mainly to those disciplines requiring large research teams and expensive equipment, and over time there was a policy shift towards centres with potential commercial spin-offs. Increasingly, the individual universities also allocated a proportion of operating grants to centre building. The rise of centres as the main medium of research activity in many fields furthered overall tendencies to concentration and selectivity. The use of competitive mechanisms and project formats in research was advanced also by the growth of commercial research and the generalisation of intellectual property arrangements (Wood 1992), though technology transfer did not develop to American levels because of the relative weakness of local industry.

Equally important was the shift to a more managed research system. Dawkins (1988) advocated a modernised corporate-style institutional management and the weakening of traditional collegial decision-making and leadership. The Commonwealth provided additional resources for the reform of institutional management , and training schemes, and it required all institutions to develop research management plans as a condition of continued public funding. Typically such plans involved the identification of strategic priorities for institutional research development, the recording of research activity and outputs, the use of formula-based systems for internal funding allocation, reducing the element of collegial politics - except in discussions over the composition of the formula - and as time went on, the establishment of mandatory targets for academic units and the devolution of responsibility for achieving those targets to individual Faculty/School,

Department and Centre heads. Submission-based competition became the main means of allocation of internal research support, as with external research support.

In the early 1990s the Commonwealth formulated the research quantum as the standard measure of research activity, following negotiations with the Australian Vice-Chancellors' Committee. This was a crucial development, shaping also the universities' own systems of measurement and funding, and furthering the longer-term homogenisation of research. The research quantum defined research activity largely in terms of income for research. This emphasised incentives to focus on the money income for research *rather than* the research activity which the quantum was meant to represent and augment. It centred institutional objectives on the economic means of research activity, rather than its knowledge contents and its social and intellectual ends and purposes. In one sense this simplified the tasks of research management, cutting across the diversity and complexity of research. The financial bottom line separated success from unsuccess, providing a simple distinction - an economically and administratively plausible distinction - between good research and bad.

The research quantum was notionally designed to provide further infrastructural support for existing research. The Commonwealth sets aside a designated proportion of total operating grants - in 1997 this was 4.9 per cent - for distribution between institutions on the basis of their measured research 'activity'. There was no mechanism that requires institutions to allocate the quantum to specific projects, and in effect the quantum operated as a performance-driven supplement to each university's total Commonwealth operating funds, but over time institutions directed a growing share of their quantum monies to those disciplines which generated those monies. The Government calculated the quantity of each institution's research activity by using a standard formula, and then distributed each institution's share of the quantum on the basis of its proportion of total research activity as so measured. In 1997 the research quantum allocated to individual universities varied from less than 1 per cent to 10.4 per cent of operating funds (see Appendix).

Table 1 Components of the Commonwealth research quantum, 1997

item	description	per cent
research income	Academically competitive grants - ARC, NHMRC and other recognised programs, but not commercial research - calculated by the National Competitive Grants Index (NCGI)	82.5
publications	books, book chapters, journal articles, other publications - using a weighted index	12.5
higher degree research completions	number of graduating research students	5.0
total		100.0

In the all-important formula for the quantum index, the largest single element (82.5 per cent) was the income from nationally competitive research grants. These included ARC, NHMRC and other recognised national schemes. Success in the large grant ARC program had strong flow-through effects on funding. These grants were notoriously scarce (the 1997 ARC success rate was about one in five), but the large grants program influences three quarters of the funding for other competitive grants, and affects the allocation of postgraduate awards, as well as directly feeding into the quantum (Gallagher 1997).. The other elements in the index are research publications (12.5 per cent) and research higher degree completions (5.0 per cent). Because these elements play a minor role, institutions have a much stronger incentive to focus on the research income aspect.

Taken together, all of these trends have changed the overall character of research activity in Australian universities. The change was driven mostly by the systems of funding, regulation and management, including the strategic deployment of 'quasi-markets' and specific market mechanisms such as competitive bidding, though commercial market forces also played a part (Marginson 1997a). Although definitive data on trends in academic time use are not available, there is little doubt that across the whole university sector the average time available for research activity fell, with the fall concentrated in those disciplines with large undergraduate teaching components. At the same time more resources were specifically allocated to research, and there were more research specialists

than before. A greater proportion of activity took the form of large scale limited life projects, favouring those disciplines in which this was the typical kind of research. A performance-based system of research had been installed. The element of merit-based selection of research activity had increased, and the element of commercial control over research output had increased. The open ended long-term program of research and scholarship subject to collegial systems of organisation had been weakened as a paradigmatic form of research activity. It was the working through of these trends in institutional organisation and cultures, and the consequences for research, scholarship and academic identities, that we aimed to explore in more detail during the study.

4. The imperative to improve research performance

This compulsion to manage research as an economic system so as to drive the continuous improvement of measured research performance derives from pressures external to the universities - principally the growing stringency in public funds, and the reorganisation of higher education as a national system-competition (Marginson 1997b) - and also the systems of research funding, output measurement and accountability. The universities have a very strong incentive to treat research in economic terms. In the absence of undergraduate tuition fees levied by institutions, research income is the largest pot of income that is capable of increase through the institutions' own actions.

Direct Commonwealth research funding is almost $1 billion per year. More than $600 million comes from ARC and DEETYA in targeted programs and the research quantum, $153 million in the operating costs of the Australian National University (ANU) Institute of Advanced Studies, and about $200 million from other Commonwealth portfolios, including over $80 million in NHMRC grants (Table 2). On top of that there is commercial research. In 1995 'other research grants and contracts' totalled $290.1 million (3.8 per cent) of incomes (Williams 1997; Gallagher 1997). In total, in 1995 universities received over $1.3 billion for research purposes, almost 20 per cent of their aggregate incomes.

Table 2 Commonwealth university research funding via DEETYA, 1997 *

Nature of funding	$m AUD	per cent
research quantum of operating grants	222.0	35.6
research infrastructure (block grant)	85.2	13.7
research infrastructure (equipment, facilities)	19.3	3.1
ARC grants	126.0	20.2
centres, collaborative grants	44.5	7.1
assistance to research students	83.3	13.4
research fellowships (ARC fellows etc.)	43.2	6.9
total	623.5	100.0

* In addition institutions receive research funding under the NHMRC program ($80.2 million AUD in 1996), approximately $120 million more from other Commonwealth portfolios (1997), and $153 million for the ANU Institute of Advanced Studies (1997).
Sources: DEETYA 1996b; Williams 1997; Gallagher 1997.

There is much at stake. Research performance is a source of prestige as well as funding. Vice-Chancellors from other institutions refer to the University of Queensland, seen to have been very successful in improving research performance. In 1983 Queensland ranked eighth in allocations from the Australian Research Grants Scheme. The implementation of research management plans and quality assurance strategies was followed by a rise to fourth in the ARC rankings by the end of the decade. Between 1983 and 1992 Queensland rose from tenth to third in NHMRC funding (UQ 1993). Not only has Queensland's income risen, it is now widely regarded as third or fourth university in Australia.

Among the older and research-stronger universities measured research performance – mostly as measured by research funding - forms a core component of marketing strategies. Among newer universities is a sign that the institution has arrived. In these marketing strategies the traditional research qualities of objectivity and truth telling undergo some remarkable twists. Each older university reworks the inter-institutional comparison to demonstrate its superiority over others. Each new university compels the reader with the picture of its carefully designed upward trajectory. Adding these claims together, research must be flourishing everywhere: every university is continually doing better and better, and all have already reached 'world class', whatever that means. Mere budget cuts cannot dampen the spirit of intellectual inquiry. Or so it seems!

Thus the University of New South Wales (University of NSW) focuses on the total level of Australian Research Council (ARC) large grants and of ARC collaborative grants with industry, where in both cases it leads the nation. It complains because the Commonwealth research quantum does not incorporate commercial income, where again it is number one. On the other hand the University of Melbourne adds to its ARC income its National Health and Medical Research Council (NHMRC) income, where it outstrips the rest, to demonstrate its overall superiority in the competitive grants supporting discipline-based academic research. The smaller universities cannot compete in terms of aggregate grant income, so sensibly they rely on per capita measures. At different times the Universities of Western Australia (UWA) and Adelaide have been first in national competitive grant funds per head. In 1993 Adelaide found that it was number one in ARC large grants per member of the research and teaching staff - provided that performance in Medicine is not considered. In 1995 Adelaide publishes a newspaper advertisement, ranking itself highest of the three universities in South Australia on all criteria. Yet when university size is taken into account Adelaide's rival Flinders University finds that it is second in the land in NHMRC funding. The University of Queensland points to its success in Cooperative Research Centres. James Cook University and the University of Tasmania look good when CRC funding per staff member are calculated. And so on.

5. *The structure of incentives*

This structuring of research as a performance economy also structures a particular pattern of incentives in research management and organisation. Some of these have already been noted. In summary, the structure of incentives is as follows:

- the generation of income becomes primary over research activity *per se*;

- the generation of income becomes primary over the generation of measured research outputs, which play a lesser role in the quantum formula;

- increasing quantity in research becomes more important than increasing quality;
- there is a tendency to the continual expansion of measured research activity;
- research is primary in relation to scholarship: the latter as such is rarely funded;
- limited life research projects take priority over open-ended programs of research and scholarship;
- research support tends to favour those with an established track record and discriminates against new researchers, weakening the potential for innovation;
- there is a tendency to generalisation of research activity within universities, partly offset by the counter tendencies to concentration of and selectivity in research;
- there is a tendency to manage research activity from a point external to the researcher, in order to maximise the measured institutional research performance.

The tendency towards continual expansion in the volume of measured research, which appears as a continual 'improvement' in research, has double roots. First, the quantum formula creates a direct economic relationship between research activity and future institutional income. Second, this is exacerbated by the ratchet-effect character of inter-university competition, which forces each university to work ever harder for its share of a constant pool of government funds. In turn this drive to quantitative growth creates an inevitable tension between quantity and quality. As one scientist argued:

> What's become important is not the generation of ideas, but the accumulation of research funds. The [University's] Deputy Vice-Chancellor (Research) is prized because research grant income is a crucial indicator of the university's standing. The University makes much more fuss of one Professor getting one million dollars a year from a pharmaceutical company than another being elected to the Academy of Science.

> What ought to be prized are the people who travel vast distances on the smell of an oily rag. The people that are prized are the people who get large amounts of money and blow it away in expensive programs that may well be quite unproductive.

From the point of view of performance management, the more funded projects the better; and so management seeks to control research activity if only to maximise it. Yet the projects that secure the largest grants or earn the most income are not necessarily those that generate the major breakthroughs or produce works of lasting importance and beauty. Researchers find themselves working not where they could make the most important contribution, but where they could most readily earn grants. Similarly, there is an incentive to maximise the number of publications, but no motive - within the funding system - to maximise the quality of publications. Researcher time is finite. At a certain point each increase in quantity will tend to produce a fall in average quality. This creates a longer-term dilemma within research management itself. Academic quality is one source of status in higher education, and status tends to attract more grants, all else being equal.

In orthodox research policy it is assumed that competitiveness is a sufficient guarantor of quality. This assumption – again indicating the role of economic metaphors in research management - is questionable. Competition for government research funding is a competition for rankings, not quality. Whether the average project is better or worse, the same total funds are distributed. Commercial research is more open-ended, but there the contest turns around commercial outcome rather than discipline-referenced quality.

It may be hypothesised that discipline-referenced research quality is proportional to the researcher's time spent in the research activity, all else being equal. In the Australian system, with the exception of research fellowships - a minor aspect of total research funding - there is no support for research time as such. The ARC large and small project grants actually prohibit allocation to Principal Researcher salary costs. Research resources (equipment, research and laboratory assistants) are funded, but principal researcher time is not. Yet in some disciplines, in which the dominant mode is that of scholarship rather than research, time is the major resource. In some such disciplines grants do not normally play a

role at all. Systems of measurement that emphasise research grants at the expense of research time tend to discriminate in favour of some disciplines and against others.

The incentives to focus on short-term economic returns rather than long-term scholarly returns, and to focus on limited life projects (the medium for funding), tends to fragment the larger researcher-directed research programs that were traditional to many disciplines. Sometimes a series of small projects will accumulate to a successful incremental program, but the scope for qualitative shifts is reduced, and there is a danger that the researcher will miss one crucial project grant, breaking the chain. Some researchers find themselves working in a growing range of areas without overall coherence. Some find themselves substituting a growing amount of commercial research in place of academically-controlled basic research; and there appears to be a general tendency towards applied research projects and away from basic research projects, across the whole higher education system.

The tendency to discrimination against innovation is inherent in a quantum-based funding system in which present funding is based on immediate past performance. It is not that the support of new researchers and new paradigms is impossible, but it needs to be specifically factored back in; and in a formula-based funding system there is a natural tendency to the marginalisation of such off-formula schemes. Yet research management also seeks to spread research activity to every nook and cranny so as to maximise potential performance. This conflict between generalisation and concentration/selectivity – an artefact of a system of centralised and comprehensive research management - can only be resolved through the imposition of a higher degree of central management control. Where researchers are free to pursue projects of their own choice in their preferred disciplines, selectivity cannot be enforced, and the contradiction in management is maximised. Only when management exercises sufficient control over research activity so as to enforce its preferred policy of concentration – at worst by moving researchers out of their preferred disciplines and into the designated disciplines or multi-disciplines - it becomes possible to concentrate research in selected areas *and* maximise measured research output at the same time, thereby escaping the dilemma. In this management framework, only a limited and pre-determined form of diversity in research can be permitted, or can succeed.

In 1995 the research team visited a pre-1987 university of medium size with a good research reputation in defined fields. The first interview was with the leading non-academic administrator. He talked fluently and at length about strategic issues before the institutions, about its decision-making and financial systems, and the relations between its academic and administrative wings. This was straight-forward. But when he began talking about research, the matter-of-fact tone gave way to the richer voice timbres of the patron and connoisseur of the arts. There was a kind of distancing, in a tone of respect, as if the world of research with its various secrets was a world that he as a manager could never completely grasp. Yet there was frustration, too. How could all that creative energy be harnessed so as to maximise the university's position? The problem - as he unself-consciously and unforgettably put it - was 'to make the butterflies fly in formation'.

6. The installation of these incentives: management technologies and systems

This structure of incentives in turn has been used to construct the specific systems and technologies of research management in each university. These are as follows:

- the adoption of a version of the Commonwealth technologies at university level (with the same patterns of commission and omission): performance-based formulae for funds distribution, competition, comprehensive measures of research income and outputs;

- the appointment of senior academic researcher leader/managers, usually at Pro Vice-Chancellor or Deputy Vice-Chancellor level, albeit with varying roles (chief administrator, committee chair, change agent, charismatic scientist, etc.);

- the development of a professionalised and growing research office with a high degree of sophistication in 'grantpersonship' – the workings of funding systems;

- the development of a commercial company or companies for brokering and organising commercial research and consultancy;

- the comprehensive management of intellectual property, now including copyright as well as patents;

- centrally funded and sponsored limited life research centres;

- strategies and structures for tying the decentralised unis (faculties, schools, centres, departments) to central management while at the same time constructing them as corporate units with devolved entrepreneurial authority;

- the propagation and generalisation of a performance-based research culture.

During 1995-1997 a common approach to fund distribution was emerging. No university questioned the mechanisms of Commonwealth funding. All sought to synchronise with those mechanisms at the local level, so as to maximise the potential financial returns. The universal approach was to model institutional activity according to formulae similar or identical to those used by the Government. Increasingly, the Commonwealth quantum was distributed back to the Faculties, Schools, Centres and Departments according to their contribution to it. Research managers described this as the key move in installing a 'performance culture'. In one university of technology the quantum funding was being distributed not just to the academic unit but to the individual. This was seen by research managers at other universities as the ultimate performance driver, the very horizon of management. Some universities broadened the installation of their research performance culture still further, distributing a larger proportion of operating grants on the basis of research performance than just the proportion comprising the quantum. At Queensland 15 per cent of operating funds were so distributed. In some cases there were variations on the quantum formula – such as more weight for publications – and the older style politicking over resources was not entirely absent, but for the most part it had been sidelined.

In cases where a quasi-quantum formula had not been installed, managements found it difficult to persuade their Faculties to report on their research activity. The economic incentive to do so was absent. But most universities had moved beyond this and were working to establish a parallel funding and measurement system at the more decentralised

level, that of the faculties/schools and below. In central management strategies, these units were modelled as entrepreneurial local firms within a large and diversified conglomerate.

There was complex variation in the institutions' systems of centrally controlled devolution. Though all of these systems had modified the older collegial system of 'bottom-up' organisation of research, in most of the pre-1987 universities, the forms and some of the substance of collegial relations had been preserved. The integration of the faculties/ schools/ departments/ centres into institutional strategy was the most delicate part of research management. No university managed its research by explicit direction from above, which would constitute a frontal attack on the collegial tradition. A mix of devolution and autonomy was used, in which devolution was the primary tool.

Devolution located faculties/ schools/ departments/ centres as the locus of research performance, and of the immediate practical decisions about research activity and of many of the decisions about new initiatives. Nevertheless, though the local units were autonomous and were expected to take responsibility for their own performance, they were *not* independent. Instead they were tethered to management by the centrally-determined management systems and technologies. Local managers often had more financial authority than under the collegial tradition, but authority that was rationed and joined to central managers. One 'bottom-up' element that had commonly survived into the new era was that of representative committees at the central level, whereby the views of local units are passed upwards to management and the local units share in research policy decisions. Nevertheless, where there were faculty-based structures at the central level there tended to be tension between representing the faculty interest in research, and maintaining a research policy across the institution. A common solution was to relegate such representative committees to a limited advisory function. Senior executives frequently described such participatory arrangements as an important part of the 'quality control' cycle, rather than a means of making good decisions or an expression of diversity and pluralism. There were also cases of looser, more centrally-controlled committees in which the departmental 'representatives' were actually controlled from or colonised from the centre.

Overall there were four identifiable models of devolution and integration, though most universities combined elements of more than one model.

1. Research organisation led by committee decision-making ('people in meetings'). In the older universities the role of such committees was often very significant, with at least some discretionary funds reserved for their disposal.

2. Research organisation led by line managers ('bosses in offices'), where the research manager-leader was responsible for research administration and budget and may command discretionary funds.

3. Research organisation led by performance measures, funding formulae and budgets ('dollars in projects'), with less direct 'steering' than model 2. There is less pressure on manager-leaders, less manager stake in and commitment to on-going research programs, less politicking over distribution, and more scope for local entrepreneurship. Though this form of devolution appears closer to the collegial tradition than does model 2, appearances can be deceptive: formulae and budget are as sure a way of deconstructing collegial research as intervention by managers, and one harder to resist.

4. Research organisation facilitated by cultural change, through the institution's official research strategy ('goals in plans').

If there is a trend overall, it is towards a hybrid of models two and three.

The main method of rearranging research at the decentralised level – used very widely by both government and institutional managers – was the limited life research centre. These were often located outside the existing departments/schools, enabling managers to shape research priorities, pick potential research winners and rearrange disciplinary activity, and to do so more directly (and at the same with a greater element of decentralised entrepreneurship) than with conventional academic departments. Most research centres were established with the goal of becoming fully self-funding within few years. Rarely did this happen even in centres producing research with commercial utility. Nevertheless, because centre form was a flexible tool of management intervention, this characteristic hyper-optimism about the economic prospects of centres was continuously repeated.

7. *Consequences for disciplinary cultures*

In these changes, the potential for the weakening of knowledge-driven research objectives and disciplinary cultures is apparent. The price of greater flexibility in resources is more 'top-down' control of resources. The capacity to collaborate within fields is weakened by sharpened inter-institutional competition. Here again the study identified institutional variation. In the pre-1987 universities and especially in the Arts and Science departments of the older universities, residual disciplinary research cultures remained strong, though punctuated by the new practices at different points. Researchers often lived a double life. They performed for the performance indicators and research plan, and they performed according to often different criteria for their academic peers. The discipline-based traditions were characterised by more loosely defined work programs, relations of power and status that were conservative and often opaque, an emphasis on tradition, and the free exchange of published research. Research was sustained by world-wide scholarly networks rather than university managers or national policy, and each discipline was different.

Nevertheless, there were powerful forces working to homogenise the disciplines. The homogenising systems used to measure and fund research collided with the specifics of different fields of knowledge. As noted, the quantum formula more closely approximated the practices of some fields than others; formulae rewarding the accumulation of commercial income tend to shift resources towards the areas with commercial potential. The use of grant income as the principal measure of research activity fitted best with medicine, engineering and the applied sciences. It was less appropriate for the humanities, the theoretical sciences and some social sciences, education and law. In those disciplines, in their classic form, publications constituted a more useful summary of activity, and the main resource need was researcher time rather than research assistance or equipment. Nevertheless, academics in those disciplines were applying increasingly for ARC grants.[2]

[2] In addition, different disciplines varied in their publications practices. In science-based disciplines the major breakthroughs were published in journal articles and refereed conference papers. Books were of lesser importance, mostly taking the form of textbooks summarising the already known. While academics working in the humanities and the social sciences also published textbooks, in these fields books were often the medium for original and pathbreaking work. The other such medium was journal articles: conference papers were mostly not

A striking example of the conflict between research norms and discipline specificity was Law. Arguably, for academics in Law the most important form of research and scholarship, the main manner in which academics create legal knowledge, was legal case books. Producing these books did not fit the conventional definition of a research project because it requires scholarship rather than empirical research, and depended on researcher time more than on research assistance. Like other academics, academics in Law were under pressure to raise ARC money and boost departmental income, directly and through the quantum. It was easier for a law academic to gain an ARC grant for a sociological or historical project about Law - that is, a project conducted outside legal knowledge itself - than to gain a grant for creating legal knowledge in a major case book. In this manner the orthodox systems of research funding and management tended to diminish the field.

A group with weightier difficulties was those working in the Visual and Plastic Arts. There the processes of reflection on the field, teaching-reflective synergy, and work at the cutting edge, took place not in laboratory research as in the science-based disciplines, or scholarship as in the humanities, but the production of works of art. And if the humanities were difficult to fit with conventional definitions of research, it was near impossible to stretch the definitions to include works of art. Nevertheless academics working in the Arts found themselves creating a redundant theoretical component to their projects, in order to satisfy the ARC norms for research projects and secure the much needed funding.

In an era of self-regulating systems, deceptively consistent as they are with the old collegial principle of academic freedom, it is the researchers themselves that must reconcile as far as they can these different imperatives of knowledge creation and wealth creation. Research work is carried out by autonomous individuals, so that changes in research organisation can only happen when those changes are self-managed, self-regulated and self-imposed. People who manage their own work are more likely to take the initiatives necessary to secure the institution's objectives, and are less likely to resist. The study found that even while research managers sought to remake research and researchers, it held them at arms length. Academic freedom survived, at least as a point of dispute. But

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refereed, carrying less significance than in the sciences. The balance between number and quality of publications also varied by discipline. In some the norm was to publish a large number of papers. Such disciplines benefited from quantitative measures of output, which tended to distribute resources in their favour. Other disciplines published a smaller number of more selected and high quality papers.

academic freedom was changed, subjected to standardised management systems, and (with management's support) to commercial market forces. If researchers were subjected to direct instruction from above, their active consent would scarcely be secured.

It was this shaping of researcher identity from a distance that made possible the economisation of research, and also *vice versa*. Once introduced into research, the administered economic imperatives and market forces became naturalised, so that the quantitative expansion of research could be derived from the intensification of the work carried out by researchers themselves; and by the researchers themselves chasing funds and pleasing clients, roles that until recently were unfamiliar to many. In this manner research began to become transformed from practices that were self-defined and other researched, to practices that were increasingly self-financed, but other-determined.

8. Implications

How might these trends be modified? The major plank of a more enlightened regime would be the re-strengthening of disciplinary cultures. Here the most important move is the development of systems of measurement, classification and funding of research activity that are discipline-specific rather than generic, so that the structure of incentives and outputs can be aligned with the internal practices of each of the disciplines themselves.

Other implications are the need for more research support as time allowances, and researcher salaries; and full-time fellowships in place of the almost exclusive reliance on limited life research grants. Full-time fellowships permit more holistic and long term research programs, discipline-directed, rather than determined by the funding agency.

Table A1 Distribution of Commonwealth research quantum between Australian universities, 1997

'Sandstone' and 'Redbrick' universities	$m AUD	Other pre-1987 universities	$m AUD	Post-1986 universities	$m AUD
ANU **	n.a.	Flinders	6.027	Curtin UT *	4.331
Melbourne	28.243	Newcastle	5.949	RMIT *	3.982
Sydney	22.331	Macquarie	5.686	Queensland UT *	3.600
NSW	21.915	La Trobe	5.438	South Australia *	3.003
Queensland	21,460	New England	4.202	Technology, Sydney *	2.368
Monash	17.575	Wollongong	4.052	Western Sydney	1.665
Adelaide	14.139	Griffith	3.843	Canberra	1.288
WA	14.125	James Cook	3.782	Victoria	1.270
		Murdoch	2.893	Swinburne UT	1.026
[Tasmania] ***	[5.431]	Deakin	1.294	Northern Territory	0.865
				Charles Sturt	0.806
				Edith Cowan	0.797
				Southern Qld.	0.615
				Central Qld.	0.598
				Southern Cross	0.384
				Ballarat	0.195
				Australian Catholic	n.a.

* large universities of technology (see text).

** The Australian National University (ANU) includes the Institute of Advanced Studies, which is much the largest concentration of funded research activity in Australia, but whose academics are ineligible for large grant ARC funding and reckoned as outside nationally competitive grants and the quantum for funding purposes. The Faculties at ANU, exclusive of the Institute of Advanced Studies, generated research quantum of $6.476 in 1997.

*** Tasmania was an early university foundation but is small relative to the other 'Sandstones'. It is marginal to this group, sharing some characteristics with the second group.

Data from O'Kane 1997. n.a. means not applicable. For more discussion of the groupings of institutions used in the table see Marginson 1997c.

Table A2 Research quantum as a proportion of operating grants (1997) and research earnings per staff member (1995), Australian universities

	Research quantum per operating grant (1997)			Total research earnings per equivalent full-time staff (1995)		
	research quantum	operating grant	quantum as share	research income	FTE staff	income per head
	$m AUD	$m AUD	%	$m AUD		$ AUD
Western Australia	14.125	122.420	11.54	44.568	893	49908
Adelaide	14.139	129.285	10.94	45.587	861	52946
Melbourne	28.243	271.301	10.41	83.087	2190	37940
NSW	21.915	226.641	9.67	61.326	1652	37122
Queensland	21.460	251.347	8.54	70.104	1731	40499
Sydney	22.331	191.456	7.66	59.274	2090	28361
Flinders	6.027	84.377	7.14	17.357	667	26022
Monash	17.575	265.039	6.63	50.263	2214	22702
Macquarie	5.686	99.921	5.69	17.403	726	23971
New England	4.202	79.265	5.30	8.366	517	16182
Tasmania	5.432	102.929	5.28	13.528	738	18331
James Cook	3.782	76.782	4.93	9.253	575	16092
Wollongong	4.052	85.067	4.76	10.335	556	18587
Newcastle	5.949	132.044	4.51	19.556	793	24660
Murdoch	2.893	64.446	4.49	7.748	406	19084
La Trobe	5.438	156.021	3.49	12.731	1171	10872
Curtin UT	4.331	133.077	3.26	10.421	925	11266
ANU •	6.476	208.398	3.10	19.519	1261	15479
Northern Territory	0.865	31.845	2.72	2.801	202	13865
Griffith	3.843	145.800	2.64	11.314	835	13549
RMIT	3.982	153.010	2.60	11.497	1069	10755
Canberra	1.288	51.446	2.50	3.221	335	9614
South Australia	3.003	144.140	2.08	11.012	1033	10660
Queensland UT	3.600	191.368	1.88	9.212	944	9758
Swinburne UT	1.026	56.597	1.81	2.169	374	5799
U. Technology, Sydney	2.368	134.365	1.76	5.616	732	7672
Victoria UT	1.270	97.525	1.30	3.707	605	6127
Central Queensland	0.598	58.303	1.03	9.212	944	9758
Southern Queensland	0.615	62.469	0.98	1.631	360	4529
Deakin	1.294	133.610	0.97	2.759	844	3269
Western Sydney	1.665	178.647	0.93	3.999	874	4575
Charles Sturt	0.806	92.011	0.88	1.938	514	3770
Southern Cross	0.384	47.104	0.82	0.766	231	3317
Edith Cowan	0.797	98.953	0.81	1.936	655	2956
Ballarat	0.195	30.564	0.64	0.667	218	3060
Australian Catholic	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

• see notes to Table A1.

Data from O'Kane 1997.

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